

AMENDMENTS TO THE SPECIFICATION:

Please amend the paragraph beginning at page 2, line 18, and continuing to page 3, line 5, as follows:

The low power and resultant low range of the unlicensed-radio interface means that several such access networks may be provided in relatively close proximity, for example one access network per floor of an office building or in a private home. The connection between the unlicensed-radio transceivers and the associated controller is preferably provided by a fixed broadband network. Preferably communication over this network uses the internet protocol IP, which greatly facilitates the installation of the access network, permitting a subscriber to plug-in an unlicensed-radio transceiver in his own home and even move it temporarily to an alternative location[[.]] and consequently install an unlicensed-radio access point himself. The combination of the small size of the access point coverage areas and the ease with which it can be installed and moved means that each access point controller will be controlling a very large but frequently changing number of cells compared to the equivalent base station controller of a conventional cellular network. Consequently when a mobile station roaming somewhere in the unlicensed radio access network must be paged by the core network, the signalling load on the access point controller will be very high due to the large number of cells and access points implicated.

Please amend the caption on page 3, line 7, as follows:

BRIEF SUMMARY OF THE INVENTION

Please amend the paragraphs beginning at page 3, line 8, and continuing to page 3, line 27, as follows:

In the light of the above problems it is an object of the present technology invention to provide an unlicensed-radio access network capable of locating a mobile station in response to a paging signal from the core network without undue signalling load.

~~This and further objects are achieved in an unlicensed-radio access network and method carried out in the same in accordance with the attached claims.~~

Specifically, the unlicensed-radio access network is connected to a core network portion of a licensed mobile cellular network and includes an access controller connected to the core network and a fixed broadband network connected to the access controller and having a plurality of access points. Each access point defines a mini-cell coverage area and supports an unlicensed-radio interface permitting communication between mobile stations located within a respective mini-cell and the access controller. In accordance with the invention an example embodiment, the access controller is associated with one or more location areas in the licensed-radio mobile cellular network and comprises a database for storing the identification of mobile stations in association with address information on the fixed broadband network or at least one access point for each mobile station.

Please amend the paragraph beginning at page 4, line 23, and continuing to page 5, line 4, as follows:

In accordance with an ~~preferred example embodiment of the invention~~, the database is updated without the involvement of the core network. Specifically, the access network controller is adapted to receive from a mobile station a message registering identification data for the mobile station and to store the new identification data in the database in association with information concerning an access point communicating with said mobile station. Similarly, the access controller is adapted to delete the identification data when the mobile station is no longer communicating with it. This may be on receipt of a message from the access point that said mobile station is no longer communicating with said access point. Alternatively, the access controller may monitor the connection established with a mobile station and determine when this connection is no longer maintained.

Please amend the paragraph beginning at page 5, line 7, and continuing to page 5, line 9, as follows:

Further objects and advantages of the present ~~technology invention~~ will become apparent from the following description of the preferred embodiments that are given by way of example with reference to the accompanying drawings. In the figures

Please amend the paragraphs beginning at page 5, line 17, and continuing to page 5, line 24, as follows:

Fig. 3 schematically illustrates the unlicensed access network in accordance with the ~~present invention for an~~ first example embodiment, and

Fig. 4 schematically illustrates the unlicensed access network in accordance with the ~~present invention for a second~~ example embodiment wherein the unlicensed-radio access network has transparent access points.

Please amend the paragraphs beginning at page 5, line 27, and continuing to page 6, line 24, as follows:

Figure 1 schematically depicts parts of a conventional GSM network. This network is essentially divided into a core network portion 20 and an access portion 10. The elements of the core network illustrated in the figure include the mobile switching centers or ~~MSe's~~-MSCs 202, associated home location register HLR 201 and visitor location register VLR 204. The function and structure of these conventional GSM architecture elements are known to those in the art and will not be described in further detail here. The core network also supports the General Packet Radio Service (GPRS), and to this end serving GPRS support nodes (SGSN) 203 are illustrated. Although not illustrated in the figure, it will be understood by those skilled in the art that the core network portion may include access to other mobile and fixed-line networks, such as ISDN and PSTN networks, packet and circuit switched packet data networks such as intranets, extranets and the Internet through one or more gateway nodes.

The access portion essentially ~~consists of~~comprises base station subsystems BSS 10, one of which is illustrated in Fig. 1, which communicate via defined fixed standard A and Gb interfaces with MSCs 202 and SGSNs 203, respectively in the core network portion 20. Each base station subsystem BSS 10 includes a base station controller BSC 103 which communicates with one or more base transceiver stations BTS 101 via the defined A_{bis} air interface 102. The base transceiver stations 101 communicate with mobile terminals MS 1 over the GSM standard U_m radio air interface. It will be understood that while the BTS 101 and BSC 103 are depicted as forming a single entity in the BSS 10, the BSC 103 is often separate from the BTSs 101 and may even be located at the mobile services switching centre MSC 202. The physical division depicted in Fig. 1 serves to distinguish between the parts of the network making up the access network portion 10 and those that form the core network portion 20.

Please amend the paragraph beginning at page 7, line 1, and continuing to page 7, line 15, as follows:

The components ~~making up~~ comprising this unlicensed-radio access network portion 30 also enable the mobile terminal 1 to access the GSM core network portion, and through this, other communication networks via an unlicensed-radio interface X, represented in Fig. 1 by the bi-directional arrow 31. By unlicensed-radio is meant any radio protocol that does not require the operator running the mobile network to have obtained a license from the appropriate regulatory body. In general, such unlicensed-radio technologies must be low power and thus of limited range compared to licensed mobile radio services. This means that the battery lifetime of mobile terminals will be greater. Moreover, because the range is low the unlicensed-radio may be a broadband radio, thus providing improved voice quality. The radio interface may utilise any suitable unlicensed-radio protocol, for example a wireless LAN protocol or Digital Enhanced Cordless Telecommunications (DECT). Preferably, however, Bluetooth radio is utilised, which has a high bandwidth and lower power consumption than conventional public mobile network radio.

Please amend the paragraph beginning at page 7, line 25 and continuing to page 8, line 14, as follows:

The element of the fixed access network portion 30 adapted to communicate across the Bluetooth interface is designated a local or home base station (HBS) 301. This element handles the radio link protocols with the mobile terminal MS 1 and ~~contains~~ comprises radio transceivers that define a cell in a similar manner to the operation of a conventional GSM base station transceiver BTS 101. The home base station HBS 301 is controlled by a home base station controller HBSC 303, which communicates with a mobile service switching centre MSC 202 over the GSM standard A interface and also with a serving GPRS support node SGSN 203 over a standard Gb interface, if available in the core network portion. The interface between the home base station HBS 301 and its home base station controller HBSC 303 is designated a Y-interface. The home base station controller HBSC 303 provides the connection between the MSC 202 or SGSN 203 and mobile terminal 1. The joint function of the home base station HBS 301 and the home base station controller HBSC 303 emulates the operation of the BSS 10 towards the SGSN 203 and MSC 202. In other words, when viewed from the elements of the core network 20 such as the mobile service switching centre (MSC) 202 and the serving GPRS support node (SGSN) 203, the fixed access network portion 30 constituted by the home base stations HBS 301 and the home base station controller HBSC 303 looks like a conventional access network portion 10.